

Description

Apparatus for Tornado Shelter in Automobile Maintenance Pit

BACKGROUND OF INVENTION

[0001] The present invention relates to tornado shelters, and in particular, to adding the functionality of a tornado shelter to a residential automobile maintenance pit which is a cavity in the ground of a residential garage or a carport.

[0002] In-ground tornado shelters are available in the market place. Designs like U.S. Patent 6,161,345 mainly consist of an enclosure with one door for accessing the enclosed area. Their single purpose is to provide a shelter when tornado hits. In case the tornado hit, debris might fall on to the top of the door, and possibly jam the door. These designs lack the redundancy provided by multiple doors where all doors are less likely to be jammed at the same time. Though U.S. Patent 6,161,345 can be installed in a residential automobile garage, its use as a maintenance pit is not intended and not suitable.

[0003] U.S. Patent 4,966,217 adds a safety cover or door to an automotive service pit. It is designed for commercial automobile service facilities to prevent people from falling into the pit, not for a residential tornado shelter.

[0004] The purpose of the present invention is to allow a residential automobile maintenance pit function as a tornado shelter by adding at least two doors near the top level over the full length of the pit. This added functionality is an incentive for customers who want to have more practical use of their investment.

SUMMARY OF INVENTION

[0005] An apparatus having at least two doors near its top level is installed in an automobile maintenance pit. Each of the doors can be opened and closed even when an automobile is parked directly above the pit. Each of the doors can be opened in two opposite directions. When all the doors are in at least one of the open positions, maintenance tasks can be performed by a person in the pit, beneath the automobile. When the doors are in the close position, the covered space in the pit becomes a tornado shelter.

BRIEF DESCRIPTION OF DRAWINGS

[0006] Fig. 1 is a hidden line removed isometric view of the

present invention.

- [0007] Fig. 2 is a hidden line removed isometric view of the rolling door assembly with the door in close position.
- [0008] Fig. 3 is a top view of the rolling door assembly with the door in close position.
- [0009] Fig. 4 is a section view taken along section line 4 – 4 of Fig. 3.
- [0010] Fig. 5 is a section view taken along section line 5 – 5 of Fig. 3.
- [0011] Fig. 6 is a hidden line removed isometric view, with doors 21, 22 and 23 in the right open position and with rear top door guides 35 and front top door guides 36 removed.
- [0012] Fig. 7 is a front end cut-away, hidden line removed isometric view of the present invention with all doors in close position, in an existing automotive maintenance pit.
- [0013] Fig. 8 is a front end cut-away, hidden line removed isometric view of the present invention with all doors in the right open position and all top door guides removed, in an existing automotive maintenance pit.
- [0014] Fig. 9 is a top view of the present invention integrated with the automotive maintenance pit.
- [0015] Fig. 10 is a section view taken along section line 10 – 10 of Fig. 9.

DETAILED DESCRIPTION

[0016] To avoid cluttering the drawings, individual slats 41 of rolling doors 21, 22, and 23 are not shown in all isometric views.

[0017] Refer to Fig. 1. The apparatus of the present invention consists of a frame and three modules of rolling door assemblies. The said frame consists of lower left brace 11, lower front brace 12, lower right brace 13, lower rear brace 14, upper left brace 15, upper front brace 16, upper right brace 17, upper rear brace 18 and ladder 19. Each rolling door of the said rolling door assemblies can be rolled to the close position as illustrated by the rear rolling door 21, the left open position as illustrated by the middle rolling door 22 and the right open position as illustrated by the front rolling door 23. The said rolling door assemblies are held in place by the said frame.

[0018] Refer to Fig. 2. The rolling door assembly consists of rolling door 21 in this case in the close position, rear left door guide 31, rear top door guide 35, rear right door guide 32, front left door guide 33, front top door guide 36, and front right door guide 34. Rear left door guide 31 and front right door guide 34 are identical. Rear right door guide 32 and front left door guide 33 are identical.

Rear top door guide 35 and front top door guide 36 are identical. Other components of the rolling door assembly not identified in this drawing are rollers 41, slats 42 and eyebolts 43.

[0019] Fig. 3 is the top view of the rolling door assembly showing a plurality of slats 42 of the rolling door 21 in close position. Section view along section line 4-4 is shown in Fig. 4. Section view along section line 5-5 is shown in Fig. 5.

[0020] Refer to Fig. 4, the section view along section line 4-4 of Fig. 3, and Fig. 5, the section view along section line 5-5 of Fig. 3. The rolling door 21 consists of a plurality of rollers 41 and slats 42. Each slat 42 interlocks with neighboring slats 42 and is supported by one each roller 41 at each of its two ends. Door guides 31, 32, 34, 35, 36 and 33 in Fig. 3 have roller guide of the same C-shaped cross section. Rollers 41 can travel in the C-shaped roller guide of said door guides 31, 32, 33, 34, 35 and 36. Top door guides 35 and 36 have curved portion near both ends to allow the movement of rolling door 21 change direction, from horizontal to vertical and vice versa. Top door guides 35 and 36 have enlarged ends to accept slip-in connection of left door guides 31 and 33 and right door guides 32 and 34. Rear top door guide 35 is secured in the left

end by one first eyebolt 43 to rear left door guide 31 and in the right end by one second eyebolt 43 to rear right door guide 32. Front top door guide 36 is secured in the left end by one first eyebolt 43 to front left door guide 33 and in the right end by one second eyebolt 43 to front right door guide 34. Eyebolts 43 can be screwed through the wall of the C-shaped roller guide and function as locks to restrict travel of rolling door 21.

[0021] Refer to Fig. 6. Rear rolling door 21, middle rolling door 22 and front rolling door 23 are rolled to the right open position. By first removing all eyebolts 43, rear top door guides 35 and front top door guides 36 of each rear rolling door assembly, middle rolling door assembly and front rolling door assembly can be removed to allow unrestricted movement of a person working in the automobile maintenance pit along the full length of the automobile maintenance pit.

[0022] Refer to Fig. 7. The apparatus of the present invention is installed in an existing rectangular shaped cavity of automobile maintenance pit surrounded by wall 51. All doors of the apparatus are in close position near the top level 52.

[0023] Refer to Fig. 8. Same as in Fig. 7 except that all rolling

doors are in the right open position and that all rear top door guides 35 and front top door guides 36 of rear, middle and front rolling door assemblies are removed.

[0024] Refer to Fig. 9 and Fig. 10. The apparatus of the present invention can be integrated into the walls of the automobile maintenance pit that uses concrete as the wall material. The top view Fig. 9 shows upper braces 15, 16, 17 and 18 are visible. Fig. 10 is taken from section line 10-10 of Fig. 9. The apparatus is positioned in the cavity prior to pouring of concrete with proper form board arrangement to let concrete fill in the region between upper right brace 17 and lower right brace 13 as well as upper left brace 15 and lower left brace 11. After concrete solidifies, the apparatus is firmly anchored in the automobile maintenance pit.